

tert-BUTYL ALCOHOL

CAS Registry Number: 75-65-0

$(\text{CH}_3)_3\text{COH}$

Molecular Formula: $\text{C}_4\text{H}_{10}\text{O}$

tert-Butyl alcohol is a volatile, colorless liquid which forms rhombic crystals when frozen. It has a camphor-like odor. It is miscible in esters, and aromatic and aliphatic hydrocarbons, and soluble in water (Merck, 1989). tert-Butyl alcohol is highly flammable (Sax, 1989).

Physical Properties of tert-Butyl Alcohol

Synonyms: t-butanol; 2-methylpropanol-2; trimethylcarbinol; tert-butanol

Molecular Weight:	74.12
Boiling Point:	82.41 °C
Melting Point:	25.7 °C
Flash Point:	11.1 °C (52 °F) (closed cup)
Vapor Density:	2.55 (air = 1)
Vapor Pressure:	41.67 mm Hg at 25 °C
Density/Specific Gravity:	0.7858 at 20/4 °C (water = 1)
Log/Octanol Water Partition Coefficient:	0.35
Henry's Law Constant:	1.175×10^{-5} atm-m ³ /mole
Autoignition temperature:	896 °F
Conversion Factor:	1 ppm = 3.03 mg/m ³

(HSDB, 1991)

SOURCES AND EMISSIONS

A. Sources

Major uses of tert-butyl alcohol are in the manufacture of flotation agents, perfumes, paint removers, methacrylate, and food flavorings. It is used as a denaturant for ethanol, an octane booster in unleaded gasoline, and as a cleaning agent and solvent for pharmaceuticals, waxes and lacquers (Merck, 1989; Sax, 1987; Howard, 1990). The primary stationary sources of tert-butyl alcohol in California are office furniture manufacturing, rubber and miscellaneous plastic products, and glass products (ARB, 1997b).

B. Emissions

Toxic Air Contaminant Identification

List Summaries - ARB/SSD/SES

September 1997

The total emissions of tert-butyl alcohol from stationary sources in California are estimated to be at least 27,000 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of tert-butyl alcohol was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of tert-butyl alcohol.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of tert-butyl alcohol was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Based on its vapor pressure, tert-butyl alcohol will exist almost entirely in the vapor phase in the ambient atmosphere. The dominant tropospheric loss process of tert-butyl alcohol is by reaction with the hydroxyl (OH) radical. The calculated half-life and lifetime of tert-butyl alcohol due to reaction with the OH radical are 9 days and 13 days, respectively (Atkinson, 1995). The reaction products are formaldehyde and acetone (Atkinson, 1994).

AB 2588 RISK ASSESSMENT INFORMATION

Although tert-butyl alcohol is reported as being emitted in California from stationary sources no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to tert-butyl alcohol are inhalation, ingestion, and dermal contact.

Non-Cancer: tert-Butyl alcohol primarily impairs the central nervous system and may cause headache, muscle weakness, giddiness, incoordination, confusion, nausea and/or vomiting.

Irritation of skin, eyes, and throat, coughing, and shortness of breath may also be noted. It may also be irritating to skin upon direct contact (HSDB, 1995). Animals exposed over most of their lifetime to tert-butyl alcohol in their drinking water developed adverse effects on kidneys, thyroid gland, and urinary bladder (NTP, 1994a).

Neither the Office of Environmental Health Hazard Assessment nor the United States Environmental Protection Agency (U.S. EPA) have developed non-cancer health standards for acute or chronic exposures to tert-butyl alcohol.

In studies of pregnant laboratory rodents, decreased number of births and developmental delays were noted at levels that were also maternally toxic (Daniel and Evans, 1982).

Cancer: There was some evidence of carcinogenicity in male rats and female mice exposed to tert-butyl alcohol for two years in their drinking water; increased tumors were observed in kidneys and thyroid glands. tert-Butyl alcohol has not been evaluated for carcinogenicity by the U.S. EPA or International Agency for Research on Cancer (U.S. EPA, 1995a).

